# To the beat of your own drum

Students build drums from various containers to explore the relationship between surface area, volume and sound. Throughout this lesson, opportunities are embedded for engaging with Aboriginal and/or Torres Strait Islander communities and cultures.

## Visible learning

### Learning intentions

* To explore the relationship between volume, surface area and sound.
* To calculate the volume and surface area of cylinders and composite solids.

### Success criteria

* I can calculate the volume and surface area of cylinders.
* I can describe the relationship between volume, surface area and sound.

### Syllabus outcomes

A student:

* develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly **MAO-WM-01**
* solves measurement problems by using scientific notation to represent numbers and rounding to a given number of significant figures **MA5-MAG-C-01**
* solves problems involving the volume of composite solids consisting of right prisms and cylinders **MA5-VOL-C-01**

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## Activity structure

### Launch

1. Play Robert Tiso’s video ‘Glass music-Dance of the sugar plum fairy-Tchaikovsky (1:57)’ ([bit.ly/youtuberoberttiso](https://bit.ly/youtuberoberttiso)). Play the video a second time and ask students to write a list of what they notice and what they wonder ([bit.ly/noticewonderstrategy](https://bit.ly/noticewonderstrategy)) while watching again.
2. Have a class discussion about students’ notice and wonder lists. Possible discussion points could include:
3. Why does the musician need so many glasses?
4. What is causing the glasses to make different sounds?
5. Do instruments with greater volume make different sounds to those with smaller volume?
6. Do instruments with a greater surface area make different sounds to those with a smaller surface area?

### Explore

Explain to the students that in this lesson they will construct drums using balloons and various containers to investigate the relationship between volume, surface area and sound.

### Equipment

At least 2 of each item per group:

* Tin cans and/or containers (variety of shapes and sizes)
* Scissors
* Balloons
* Elastic bands or sticky tape
* Corks
* Wooden skewers

#### Method

1. Assign random groups of 3. Each group collects 2 balloons, 2 elastic bands (or sticky tape), 2 corks and 2 wooden skewers.
2. Each group chooses 2 tin cans or containers to use as the base of their drum.
3. Groups are positioned at Vertical Non-Permanent Surfaces ([bit.ly/VNPSstrategy](https://bit.ly/VNPSstrategy)) around the room. Discuss what sound they think their drum will make. Groups take turns showing their containers to the class and sharing their predictions.
4. Groups draw a sketch and take measurements of their drums and calculate the surface area and volume of both drum containers.
5. Display or write up instructions on how to build their drums:
6. Cut the tip off the balloon.
7. Tightly fit the balloon over the opening of the can or container.
8. Use elastic bands or tape to hold the balloon in place.
9. Push a wooden skewer through a cork to create a drumstick.

Alternatively, this YouTube video, Make Your Own Tin-Can Drums! (5:58) ([youtu.be/g3iBeFxItbc](https://youtu.be/g3iBeFxItbc)) demonstrates how to construct and play tin can drums.

### Summarise

1. Groups take turns playing their drums for the class, sharing the properties of their drum container and what they found out through the exploration.
2. Once the class have all shared, a group discussion can be had about the relationship between container properties and sounds produced.

The class could come to a consensus about the relationship between the volume, surface area and sound, by considering what happens to the sound as the volume increases and the surface area increases. The class could test their theory by lining up the drums to check the sound for volume and then do the same for surface area.

### Apply

* Ideally, this lesson could lead to a visit to or from a local Aboriginal or Torres Strait Islander persons or group to share the process and culture surrounding didgeridoo creation.
* If a visit is not possible, this YouTube video from Didge Project, ‘Comparing 5 Eucalyptus Didgeridoos (all traditional Aboriginal Australian instruments) (5:47)’ ([bit.ly/didgeproject](https://bit.ly/didgeproject)), compares 5 didgeridoos of various materials and dimensions. Students could explore if the relationships they established with the drums is also true for didgeridoos.

## Assessment and differentiation

### Suggested opportunities for differentiation

**Explore**

* Composite containers and/or path solids could be used to construct drum bases, broadening the investigation, and allowing students to calculate with figures from the Path content.
* An investigation could stem from this lesson into diverse instruments and the relationships between dimension and sound. Instruments such as warup drums, kettle drums and rain sticks could provide opportunities to explore the relationships between cultures and instruments.

**Apply**

* Dimensions are provided for each didgeridoo in the YouTube video Comparing 5 Eucalyptus Didgeridoos (all traditional Aboriginal Australian instruments). Students can sketch and find the surface area and volume for each didgeridoo.

### Suggested opportunities for assessment

* Monitor student discussions to check for common misconceptions.
* Collect student drum sketches and calculations to check for understanding.
* Record students’ observations on the relationships between surface area, volume and sound.

## References

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